

Dear Family,

This week your student is learning how to add, subtract, and multiply decimals up to the thousandths place.

Previously, your student learned how to add, subtract, and multiply whole numbers using a variety of methods. Similar strategies can be used to perform these same operations with decimals.

$$\begin{array}{r} 2,135 \\ + 3,402 \\ \hline 5,537 \end{array}$$

$$\begin{array}{r} 2.135 \\ + 3.402 \\ \hline 5.537 \end{array}$$

Your student will be learning to solve problems like the one below.

Find the product of 0.23 and 2.14.

- **ONE WAY** to find the product is to write the decimals as fractions.

$$0.23 = 23 \text{ hundredths} = \frac{23}{100}$$

$$2.14 = 214 \text{ hundredths} = \frac{214}{100}$$

Then multiply the fractions.

$$\begin{aligned} \frac{23}{100} \times \frac{214}{100} &= \frac{23 \times 214}{100 \times 100} \\ &= \frac{4,922}{10,000} = 0.4922 \end{aligned}$$

- **ANOTHER WAY** is to use the standard algorithm for multiplication.

Multiply as with whole numbers. Then place the decimal point.

$$\begin{array}{r} 0.23 \leftarrow \text{hundredths} \\ \times 2.14 \leftarrow \text{hundredths} \\ \hline 92 \\ 230 \\ + 4600 \\ \hline 0.4922 \leftarrow \text{hundredths} \times \text{hundredths} = \text{ten-thousandths} \end{array}$$

Using either method, the product is 0.4922.

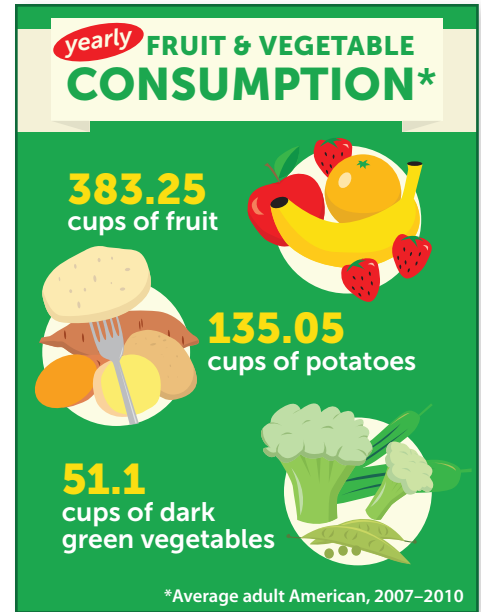


Use the next page to start a conversation about decimals.

Activity Thinking About Decimals Around You

- **Do this activity together to investigate decimals in the real world.**

Have you ever noticed that some foods are more popular than others? Each year between 2007–2010, the average adult American ate 135.05 cups of potatoes, 51.1 cups of dark green vegetables, and 383.25 cups of fruit. That is 248.2 more cups of fruit than potatoes and 83.95 more cups of potatoes than dark green vegetables!



? Where else do you see decimals in the world around you?

Explore Adding and Subtracting Multi-Digit Decimals

Previously, you learned about decimal operations to the hundredths. In this lesson, you will learn about adding, subtracting, and multiplying decimals to the thousandths.

► **Use what you know to try to solve the problem below.**



Mateo is training to swim the 100-meter freestyle event in the Youth Olympic Games. During practice, he swims two laps. What is his total time for the two laps?

TRY IT



Math Toolkit base-ten blocks, base-ten grid paper, grid paper, number lines, place-value charts

DISCUSS IT

Ask: What did you do first to find the total time?

Share: I started by ...



Learning Target SMP 1, SMP 2, SMP 3, SMP 4, SMP 5, SMP 6, SMP 7
Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

CONNECT IT

- 1 Look Back** What is Mateo's total time for the two laps? Explain how you could find the answer.
- 2 Look Ahead** Place value can help you add or subtract decimals. You add 25.393 and 24.138 to find Mateo's total time. You can subtract 24.138 from 25.393 to find how much faster Mateo swims the first lap than the second lap.
- How could it help you to line up the decimals on their decimal points?
 - What do you need to do before you can subtract the digits in the thousandths place in this problem? Explain.

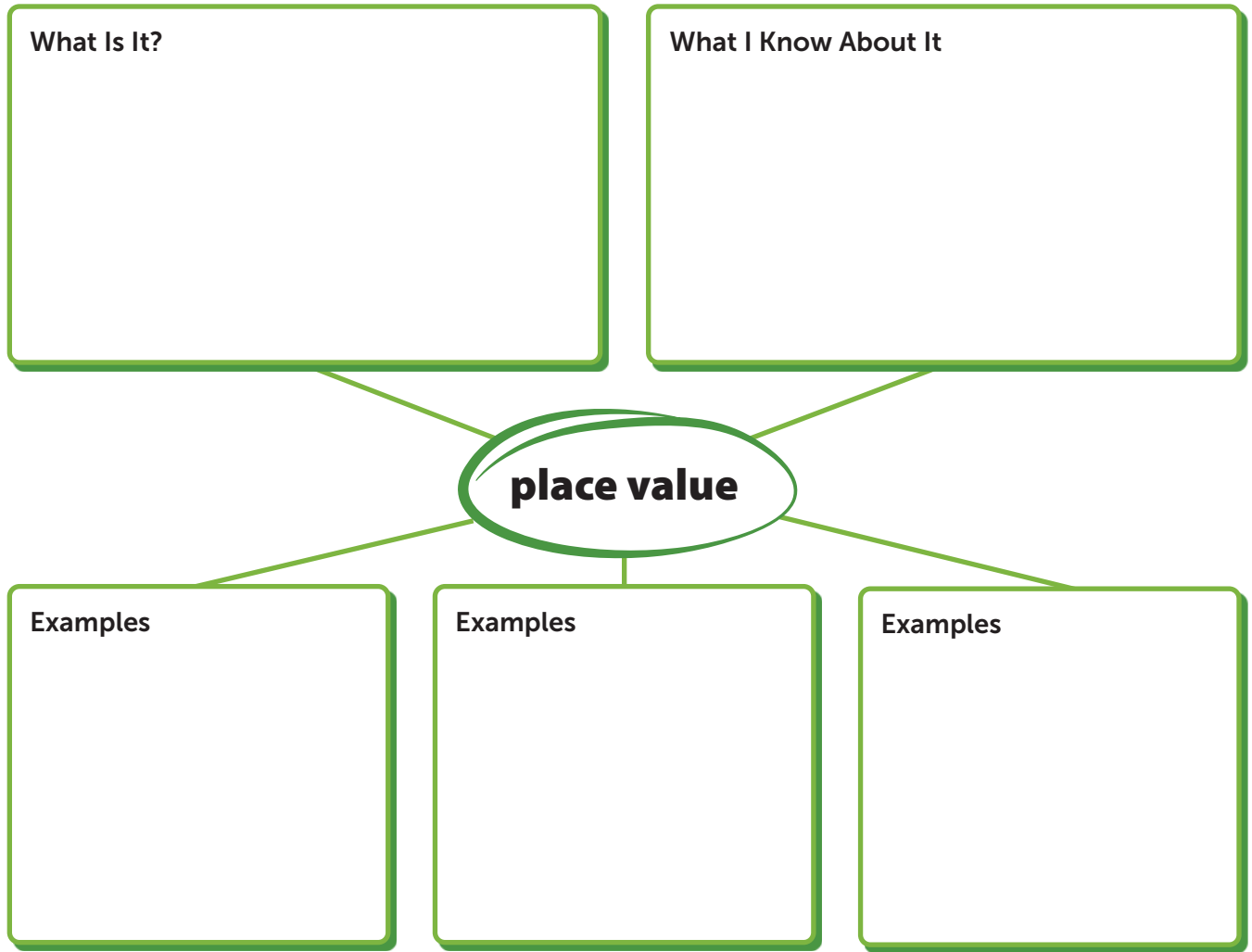
25.393
– 24.138
 - Complete the equation.

9 hundredths + 3 thousandths = 8 hundredths + _____ thousandths
 - How much faster is Mateo's time for the first lap than the second lap? How did you find your answer?

- 3 Reflect** How do you use place value when adding and subtracting decimals?

Prepare for Adding, Subtracting, and Multiplying Multi-Digit Decimals

- 1 Think about what you know about decimals and place value. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.



- 2 Wyatt says that 0.6 has the same value as 0.600. Do you agree? Explain.

- 3 In science class, Layla mixes 0.165 L of a blue liquid and 0.185 L of a green liquid.
- a. What is the total volume of Layla's mixture? Show your work.

SOLUTION _____

- b. Check your answer to problem 3a. Show your work.

Develop Using the Standard Algorithm to Add and Subtract Decimals

► Read and try to solve the problem below.

How much greater is the mass of a dollar coin than the combined masses of a dime and a quarter?

TRY IT



Math Toolkit base-ten blocks, base-ten grid paper, grid paper, number lines, place-value charts

Mass of U.S. Coins

 Penny: 2.5 g	 Nickel: 5 g
 Dime: 2.268 g	 Quarter: 5.67 g
 Half-Dollar: 11.34 g	 Dollar: 8.1 g

DISCUSS IT

Ask: How is your model similar to mine? How is it different?

Share: My model shows ...

➤ Explore different ways to understand how to add and subtract decimals.

How much greater is the mass of a dollar coin than the combined masses of a dime and a quarter?

Coin	Penny	Nickel	Dime	Quarter	Half-Dollar	Dollar
Mass	2.5 g	5 g	2.268 g	5.67 g	11.34 g	8.1 g

Model It

You can use place-value charts to add or subtract decimals.

Add the masses of the dime and the quarter.

			1			
	Tens	Ones	•	Tenths	Hundredths	Thousandths
		2	•	2	6	8
+		5	•	6	7	
		7	•	9	3	8

Subtract the combined mass from the mass of a dollar coin.

	Tens	Ones	•	Tenths	Hundredths	Thousandths
		8	•	1		
−		7	•	9	3	8
			•			

Model It

You can use an algorithm to add or subtract decimals.

Line up the decimals by place value.

$$\begin{array}{r}
 ^1 \\
 2.268 \\
 + 5.670 \\
 \hline
 7.938
 \end{array}
 \qquad
 \begin{array}{r}
 8.100 \\
 - 7.938 \\
 \hline

 \end{array}$$

CONNECT IT

► Use the problem from the previous page to help you understand how to add and subtract decimals.

- 1 Look at the first **Model It**. In the first place-value chart, why is the thousandths column for the decimal 5.67 empty?
- 2 Look at the second **Model It**. In the addition step, 5.67 is written as 5.670. Does this change the value of 5.67? Explain your reasoning.
- 3 Look at the subtraction step in the second **Model It**. Why is 8.1 rewritten as 8.100?
- 4 How much greater is the mass of a dollar coin than the combined masses of a dime and a quarter? How can you check that your answer is reasonable?
- 5 How are algorithms for adding or subtracting decimals similar to algorithms for adding or subtracting whole numbers? How are they different?
- 6 **Reflect** Think about all the models and strategies you have discussed today. Describe how one of them helped you better understand how to add and subtract decimals.

Apply It

► Use what you learned to solve these problems.

- 7 Noe makes a mistake when he finds $8.196 - 2.4$. Describe his mistake and show the correct subtraction.

Noe

$$\begin{array}{r} 8.196 \\ - 2.004 \\ \hline 6.192 \end{array}$$

- 8 Evaluate $m - 7.432$ when $m = 15.45$. Show your work.

SOLUTION

- 9 A city receives 0.063 m of rain in April and 0.15 m of rain in May. What is the total amount of rain the city receives for both months? Show your work.



SOLUTION

Practice Using the Standard Algorithm to Add and Subtract Decimals

- Study the Example showing how to use the standard algorithm to add decimals. Then solve problems 1–5.

Example

Tara's house is 1.94 km from the library. The library is 0.347 km from the park. Tara walks from her house to the library and then from the library to the park. What is the total distance Tara walks?

Line up the decimals by place value. Write each decimal with the same number of decimal places. Then regroup as needed to add.

$$\begin{array}{r} 1 \\ 1.940 \\ + 0.347 \\ \hline 2.287 \end{array}$$

Tara walks a total distance of 2.287 km.

- 1 In the Example, how much farther is it from Tara's house to the library than it is from the library to the park? Show your work.

SOLUTION

- 2 A day on Venus is about 224.7 Earth days. A day on Mercury is about 58.646 Earth days. How much longer is a day on Venus than a day on Mercury?
- A about 165.361 Earth days
- B about 166.054 Earth days
- C about 166.146 Earth days
- D about 166.641 Earth days

- 3 Evaluate the expression $4^2 - d$ when $d = 3.643$. Show your work.

SOLUTION _____

- 4 Anders adds 8.84 and 62.5, but he makes an error in his work. Describe his mistake and show the correct addition.

Anders

$$\begin{array}{r} 8.84 \\ + 62.5 \\ \hline 150.9 \end{array}$$

- 5 The length of a lap on a running track depends on the lane. Greg runs one lap in lane 4, one lap in lane 5, and one lap in lane 6. What is the total distance Greg runs? Show your work.



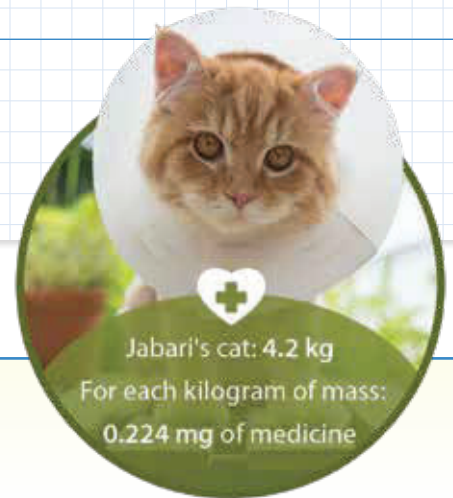
Lane Number	Lap Length (m)
1	407.67
2	415.33
3	423
4	430.66
5	433.38
6	446

SOLUTION _____

Develop Using the Standard Algorithm to Multiply Decimals

► Read and try to solve the problem below.

Jabari's cat has a mass of 4.2 kg. The cat needs 0.224 mg of medicine for each kilogram of its mass. What is the total amount of medicine the cat needs?



TRY IT



Math Toolkit base-ten grid paper, grid paper, place-value charts

DISCUSS IT

Ask: How is your strategy similar to mine? How is it different?

Share: My strategy is similar to yours . . . It is different . . .

► Explore different ways to understand how to multiply decimals.

Jabari's cat has a mass of 4.2 kg. The cat needs 0.224 mg of medicine for each kilogram of its mass. What is the total amount of medicine the cat needs?

Model It

You can use what you know about fractions to multiply decimals.

Use place value to write each decimal as a fraction.

$$0.224 = 224 \text{ thousandths} = \frac{224}{1,000}$$

$$4.2 = 42 \text{ tenths} = \frac{42}{10}$$

Then multiply the fractions.

$$\begin{aligned} \frac{224}{1,000} \times \frac{42}{10} &= \frac{224 \times 42}{1,000 \times 10} \\ &= \frac{9,408}{10,000} \end{aligned}$$

Model It

You can use an algorithm to multiply decimals.

Multiply as with whole numbers. Then place the decimal point.

$$\begin{array}{r} 0.224 \leftarrow \text{thousandths} \\ \times 4.2 \leftarrow \text{tenths} \\ \hline 448 \\ + 8960 \\ \hline \end{array} \leftarrow \text{thousandths} \times \text{tenths} = \text{ten-thousandths}$$



CONNECT IT

► Use the problem from the previous page to help you understand how to multiply decimals.

- 1 Look at the first **Model It**. How are products of whole numbers used to find the product of 0.224 and 4.2?
- 2 Look at the second **Model It**. What is the sum of the partial products 448 and 8,960? Where do you see this sum in the fraction form of the product?
- 3 Why does multiplying a decimal in the thousandths by a decimal in the tenths give a product in the ten-thousandths?
- 4 What is the total amount of medicine the cat needs, written as a decimal? How do you know where to place the decimal point in the product?
- 5 How can you use the algorithm for multiplying whole numbers when you multiply decimals?
- 6 **Reflect** Think about all the models and strategies you have discussed today. Describe how one of them helped you better understand how to multiply decimals.

Apply It

► Use what you learned to solve these problems.

- 7 Fiona earns \$7.25 for each hour that she walks her neighbor's dog. This month, she walks the dog for a total of 4.5 h.
- a. How much does Fiona earn this month? Show your work.



SOLUTION _____

- b. Did you round your answer to problem 7a? Why or why not?
- 8 What is the value of the expression x^2y when $x = 0.8$ and $y = 3.15$?
- A 0.2016
- B 0.504
- C 2.016
- D 5.04
- 9 Find the product 8.524×0.71 . Show your work.

SOLUTION _____

Practice Using the Standard Algorithm to Multiply Decimals

- Study the Example showing how to use the standard algorithm to multiply decimals. Then solve problems 1–5.

Example

A store sells ropes for rock climbing. A blue rope is 35.5 m long. Each meter of the rope has a mass of 0.064 kg. What is the total mass of the blue rope?

You can multiply decimals as you would with whole numbers. Then use what you know about place value to place the decimal point in the product.

$$\begin{array}{r}
 35.5 \quad \leftarrow \text{tenths} \\
 \times 0.064 \quad \leftarrow \text{thousandths} \\
 \hline
 1420 \\
 + 21300 \\
 \hline
 2.2720 \quad \leftarrow \text{tenths} \times \text{thousandths} = \text{ten-thousandths}
 \end{array}$$

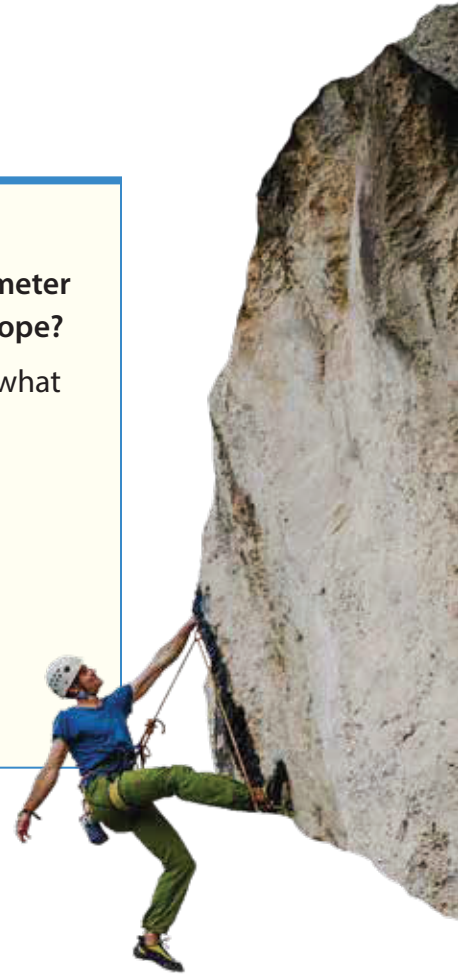
The total mass of the blue rope is 2.272 kg.

- 1 A green rope is 60.5 m long. Each meter of the rope has a mass of 0.052 kg. What is the total mass of the green rope? Show your work.

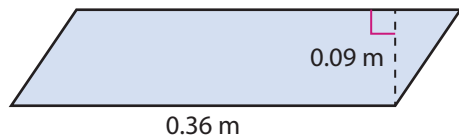
SOLUTION _____

- 2 Find 0.102×7.3 . Show your work.

SOLUTION _____



- 3 What is the area of the parallelogram? Show your work.



SOLUTION _____

- 4 At a grocery store, each pound of apples costs \$1.77. Lian weighs a bag of apples on the store's scale. The scale shows that the apples weigh 1.32 lb. How much do Lian's apples cost? Show your work.

SOLUTION _____

- 5 Ethan and Anica both multiply 3.045 and 1.3. Who finds the correct product? How do you know?

Ethan	Anica
$\begin{array}{r} 3.045 \\ \times 1.3 \\ \hline 9135 \\ + 30450 \\ \hline 3.9585 \end{array}$	$\begin{array}{r} 3.045 \\ \times 1.3 \\ \hline 9135 \\ + 30450 \\ \hline 39.585 \end{array}$

Refine Adding, Subtracting, and Multiplying Multi-Digit Decimals

► Complete the Example below. Then solve problems 1–9.

Example

An online store charges a fee of \$4.50 for shipping. There is an additional charge of \$0.50 for each pound the item weighs. How much does the store charge to ship a hammock that weighs 10.54 lb?

Look at how you could show your work using an expression and algorithms for multiplying and adding decimals.

$$4.50 + (10.54 \times 0.50)$$

$$\begin{array}{r} 10.54 \\ \times 0.50 \\ \hline 5.2700 \end{array}$$

$$\begin{array}{r} 5.27 \\ + 4.50 \\ \hline 9.77 \end{array}$$

$$4.50 + (10.54 \times 0.50) = 9.77$$

SOLUTION _____

CONSIDER THIS . . .

How does the expression show the additional charge for the hammock’s weight?

PAIR/SHARE

Why can 5.2700 be written as 5.27?

Apply It

- 1 Claudia is playing a game on her phone. She finishes Level One in 20.341 s. She finishes Level Two 1.283 s faster than she finishes Level One. How many seconds does it take Claudia to finish Level One and Level Two? Show your work.

CONSIDER THIS . . .

Which level does it take Claudia longer to finish?

SOLUTION _____

PAIR/SHARE

How would the problem change if Claudia finished Level Two more slowly than Level One?

- 2 Find 0.42×8.27 . Show your work.

CONSIDER THIS ...

How does the place value of the product relate to the place value of the factors?

PAIR/SHARE

How can you use fractions to check your work?

SOLUTION _____

- 3 Each day, Caleb feeds his horse 2.25 lb of oats. He also feeds it hay. The weight of hay is 6.5 times the weight of oats. What is the combined weight of oats and hay Caleb feeds his horse in one week?

CONSIDER THIS ...

There are 7 days in 1 week.

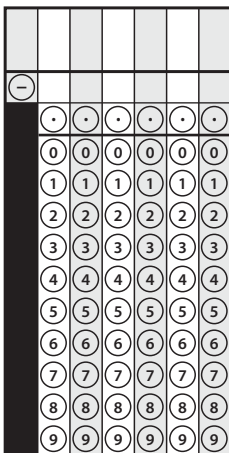
- A** 61.250 lb
B 102.375 lb
C 118.125 lb
D 259.875 lb

Naomi chose C as the correct answer. How might she have gotten that answer?

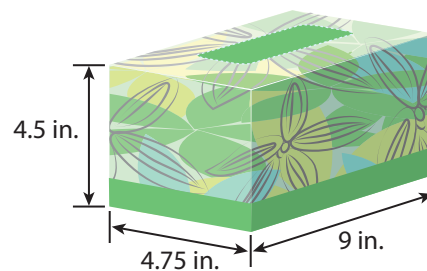
PAIR/SHARE

How could Naomi check whether her answer is reasonable?

- 4 What is the value of the expression $3ab + c$ when $a = 0.32$, $b = 0.45$, and $c = 7.2$?



- 5 What is the surface area of the tissue box? Show your work.



SOLUTION

- 6 Jennifer knows that $3,312 \times 15 = 49,680$. Based on this fact, Jennifer claims that $33.12 \times 0.15 = 0.4968$. She says that the product has four digits after the decimal point because a product of two decimals in the hundredths should be a decimal in the ten-thousandths. Describe Jennifer's error.

7 Which expressions have the same product as 0.056×0.34 ? Select all that apply.

A $\frac{56 \times 34}{100,000}$

B 0.56×3.4

C $56 \times 34 \times 0.001$

D $56 \times 34 \times \frac{1}{100} \times \frac{1}{100}$

E 56 thousandths \times 34 hundredths

8 Rani's family walks the Lower Trail three times. Elijah's family walks the Ridge Trail one time and the Panther Trail one time. Whose family walks farther? How much farther does that family walk? Show your work.



Trail Name	Length (km)
Lower Trail	2.225
Ridge Trail	3.45
Panther Trail	3.375

SOLUTION _____

9 **Math Journal** Write a multiplication problem involving decimals. Both decimals must include hundredths. Show how to solve your problem.

✓ End of Lesson Checklist

INTERACTIVE GLOSSARY Write a new entry for *combine*. Tell what you do when you *combine* two quantities.

SELF CHECK Go back to the Unit 2 Opener and see what you can check off.